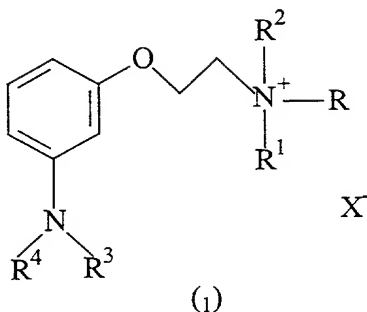


We Claim:

1. A compound of formula (1):

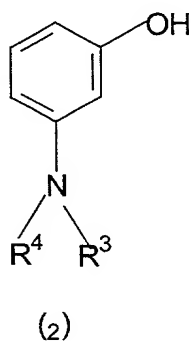


wherein X is selected from the group consisting of halogen and  $R^5SO_4$ ; R,  $R^1$ , and  $R^2$  are each individually selected from the group consisting of  $C_1$  to  $C_{22}$  alkyl,  $C_1$  to  $C_{22}$  mono or dihydroxyalkyl, or two of R,  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached form a  $C_3$  to  $C_6$  saturated or unsaturated ring optionally containing in the ring one or more additional hetero atoms selected from O, S and N atoms;  $R^3$  and  $R^4$  are each individually selected from the group consisting of  $C_1$  to  $C_6$  alkyl,  $C_1$  to  $C_6$  hydroxyalkyl,  $C_1$  to  $C_6$  alkoxy,  $C_1$  to  $C_6$  aminoalkyl or  $R^3$  and  $R^4$  together form a  $C_1$  to  $C_5$  alkylene group; and  $R^5$  is selected from the group consisting of  $C_1$  to  $C_{22}$  alkyl and  $C_1$  to  $C_{22}$  mono and dihydroxyalkyl.

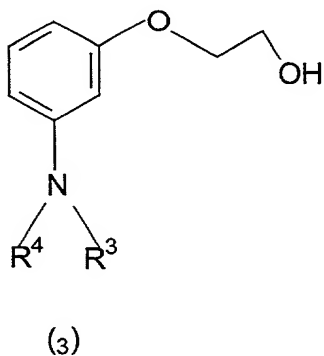
2. A compound of Claim 1 wherein X is selected from the group consisting of Cl, Br, I and  $R^5SO_4$  where  $R^5$  is  $C_1$  to  $C_3$  alkyl; and R,  $R^1$ ,  $R^2$ , are selected from the group consisting of a  $C_1$  to  $C_3$  alkyl group or two of R,  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached form a piperazinium or imidazolium group, and  $R^3$  and  $R^4$  are each individually a  $C_1$  to  $C_3$  alkyl group.

3. A compound of Claim 2 wherein each of R,  $R^1$ ,  $R^2$ ,  $R^3$ ,  $R^4$  and  $R^5$  are methyl groups.

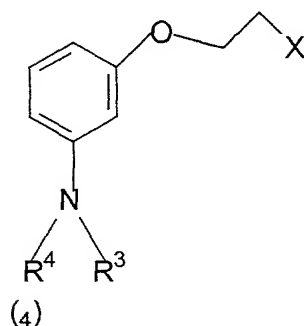
4. A compound of Claim 2 wherein X is selected from the group consisting of Cl, Br and methyl sulfate.
5. A compound of Claim 3 wherein X is selected from the group consisting of Cl, Br and methyl sulfate.
6. A compound of Claim 5 wherein X is Br.
7. A process for the preparation of a compound of formula (1) of Claim 1 comprising (a) reacting an aminophenol of the formula (2):



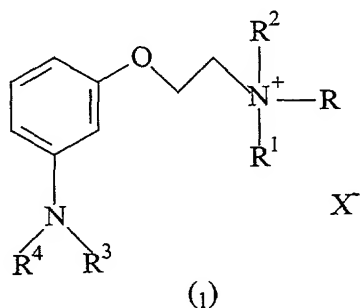
with a 2-haloethanol and potassium carbonate to produce an alcohol of formula (3):



(b) converting the alcohol of formula (3) into a compound of formula (4) by reacting the alcohol compound with triphenylphosphine and a halo-succinimide



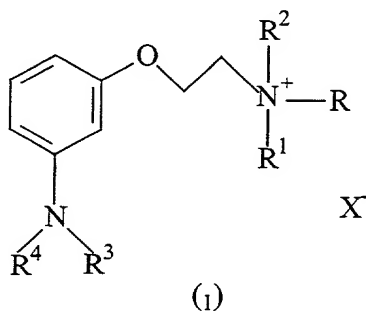
and (c) reacting the compound of formula (4) with a quaternization agent of the formula (NRR<sup>1</sup>R<sup>2</sup>) to produce a compound of formula (1)



wherein X, R, R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are as defined in Claim 1.

8. A process according to Claim 7 wherein X is selected from the group consisting of Cl, Br, I and R<sup>5</sup>SO<sub>4</sub> where R<sup>5</sup> is C<sub>1</sub> to C<sub>3</sub> alkyl; and R, R<sup>1</sup>, R<sup>2</sup>, are selected from the group consisting of a C<sub>1</sub> to C<sub>3</sub> alkyl group or two of R, R<sup>1</sup> and R<sup>2</sup> together with the nitrogen atom to which they are attached form a piperazinium or imidazolium group, and R<sup>3</sup> and R<sup>4</sup> are each individually a C<sub>1</sub> to C<sub>3</sub> alkyl group.

9. A process according to Claim 7 wherein each of R, R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are methyl groups.
10. A process according to Claim 7 wherein X is selected from the group consisting of Cl, Br and methyl sulfate.
11. A hair dye product comprising a hair dyeing composition containing at least one primary intermediate and at least one coupler and a developer composition containing one or more oxidizing agents, the hair dyeing composition containing a coupler of formula (1):



wherein X is selected from the group consisting of halogen and R<sup>5</sup>SO<sub>4</sub>; R, R<sup>1</sup> and R<sup>2</sup> are each individually selected from the group consisting of C<sub>1</sub> to C<sub>22</sub> alkyl, C<sub>1</sub> to C<sub>22</sub> mono or dihydroxyalkyl, or two of R, R<sup>1</sup> and R<sup>2</sup> together with the nitrogen atom to which they are attached form a C<sub>3</sub> to C<sub>6</sub> saturated or unsaturated ring optionally containing in the ring one or more additional hetero atoms selected from O, S and N atoms; R<sup>3</sup> and R<sup>4</sup> are each individually selected from the group consisting of C<sub>1</sub> to C<sub>6</sub> alkyl, C<sub>1</sub> to C<sub>6</sub> hydroxyalkyl, C<sub>1</sub> to C<sub>6</sub> alkoxy, C<sub>1</sub> to C<sub>6</sub> aminoalkyl or R<sup>3</sup> and R<sup>4</sup> together form a C<sub>1</sub> to C<sub>5</sub> alkylene group; and R<sup>5</sup> is selected from the group consisting of C<sub>1</sub> to C<sub>22</sub> alkyl and C<sub>1</sub> to C<sub>22</sub> mono and dihydroxyalkyl.

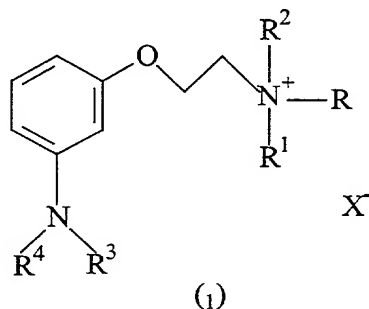
12. A hair dye product according to Claim 11 wherein the hair dyeing composition additionally contains a coupler is selected from the group consisting of: benzene-1,3-diol, 4-chlorobenzene-1,3-diol, naphthalen-1-ol, 2-methylnaphthalen-1-ol, 2-methylbenzene-1,3-diol, 2-(2,4-diaminophenoxy)ethanol, 2-(3-amino-4-methoxyphenylamino)ethanol, 2-[2,4-diamino-5-(2-hydroxyethoxy)phenoxy]ethanol, and 3-(2,4-diaminophenoxy)propan-1-ol, 3-aminophenol, 5-amino-2-methylphenol, 5-(2-hydroxyethylamino)-2-methylphenol, 3-amino-2-methylphenol, 3,4-dihydro-2H-1,4-benzoxazin-6-ol, 4-methyl-2-phenyl-2,4-dihydro-3H-pyrazol-3-one, 1H-indol-6-ol, and 2-aminopyridin-3-ol.

13. A hair dye product according to Claim 11 wherein the primary intermediate is selected from the group consisting of: 2-methylbenzene-1,4-diamine, benzene-1,4-diamine, 2-(2,5-diaminophenyl)ethanol, 1-(2,5-diaminophenyl)ethanol, 2-[(4-amino-phenyl)-(2-hydroxy-ethyl)-amino]ethanol, 4-amino-phenol, 4-methylamino-phenol, 4-amino-3-methylphenol, 1-(5-amino-2-hydroxyphenyl)ethane-1,2-diol, 2-amino-phenol, 2-amino-5-methylphenol, 2-amino-6-methylphenol, N-(4-amino-3-hydroxyphenyl)acetamide, pyrimidine-2,4,5,6-tetramine, 2-(4,5-diamino-1H-pyrazol-1-yl)ethanol, 1-(4-methylbenzyl)-1H-pyrazole-4,5-diamine, and 1-(benzyl)-1H-pyrazole-4,5-diamine.

14. A hair dye product according to Claim 13 wherein the hair dyeing composition additionally comprises a coupler selected from the group consisting of: benzene-1,3-diol, 4-chlorobenzene-1,3-diol, naphthalen-1-ol, 2-methylnaphthalen-1-ol, 2-methylbenzene-1,3-diol, 2-(2,4-diaminophenoxy)ethanol, 2-(3-amino-4-methoxyphenylamino)ethanol, 2-[2,4-diamino-5-(2-hydroxyethoxy)phenoxy]ethanol, and 3-(2,4-diaminophenoxy)propan-1-ol, 3-aminophenol, 5-amino-2-methylphenol, 5-(2-hydroxyethylamino)-2-methylphenol, 3-amino-2-methylphenol, 3,4-dihydro-2H-1,4-benzoxazin-6-ol, 4-methyl-2-phenyl-2,4-dihydro-3H-pyrazol-3-one, 1H-indol-6-ol, and 2-aminopyridin-3-ol.

15. A hair dye product according to Claim 11 wherein X is selected from the group consisting of Cl, Br, I and  $R^5SO_4$  where  $R^5$  is  $C_1$  to  $C_3$  alkyl; and R,  $R^1$  and  $R^2$  are selected from the group consisting of a  $C_1$  to  $C_3$  alkyl group, or two of R,  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached form a piperazinium or imidazolium group, and  $R^3$  and  $R^4$  are each individually a  $C_1$  to  $C_3$  alkyl group.

16. In a hair dyeing system wherein at least one primary intermediate is reacted with at least one coupler in the presence of an oxidizing agent to produce an oxidative hair dye, the improvement wherein the at least one primary intermediate comprises a compound of the formula (1):

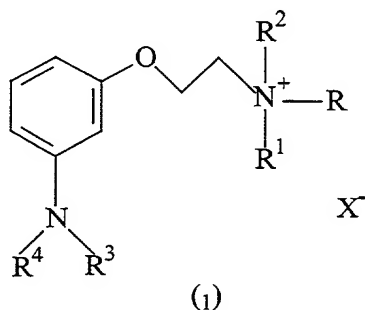


wherein X is selected from the group consisting of halogen and  $R^5SO_4$ ; R,  $R^1$  and  $R^2$  are each individually selected from the group consisting of  $C_1$  to  $C_{22}$  alkyl,  $C_1$  to  $C_{22}$  mono or dihydroxyalkyl, or two of R,  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached form a  $C_3$  to  $C_6$  saturated or unsaturated ring optionally containing in the ring one or more additional hetero atoms selected from O, S and N atoms;  $R^3$  and  $R^4$  are each individually selected from the group consisting of  $C_1$  to  $C_6$  alkyl,  $C_1$  to  $C_6$  hydroxyalkyl,  $C_1$  to  $C_6$  alkoxy,  $C_1$  to  $C_6$  aminoalkyl or  $R^3$  and  $R^4$  together form a  $C_1$  to  $C_5$  alkylene group; and  $R^5$  is selected from the group consisting of  $C_1$  to  $C_{22}$  alkyl and  $C_1$  to  $C_{22}$  mono and dihydroxyalkyl.

17. A system according to Claim 16 wherein X is selected from the group consisting of Cl, Br, I and  $R^5SO_4$  where  $R^5$  is  $C_1$  to  $C_3$  alkyl; and R,  $R^1$ ,  $R^2$  are selected from the group consisting of a  $C_1$  to  $C_3$  alkyl group, or two of R,  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached form a piperazinium or imidazolium group, and  $R^3$  and  $R^4$  are each individually a  $C_1$  to  $C_3$  alkyl group.

18. A hair dyeing composition comprising, in a suitable carrier or vehicle, an effective hair dyeing amount of:

- (a) at least one primary intermediate, and
- (b) at least one coupler comprising a compound of the formula (1):



wherein X is selected from the group consisting of halogen and  $R^5SO_4$ ; R,  $R^1$  and  $R^2$  are each individually selected from the group consisting of  $C_1$  to  $C_{22}$  alkyl,  $C_1$  to  $C_{22}$  mono or dihydroxyalkyl, or two of R,  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached form a  $C_3$  to  $C_6$  saturated or unsaturated ring optionally containing in the ring one or more additional hetero atoms selected from O, S and N atoms;  $R^3$  and  $R^4$  are each individually selected from the group consisting of  $C_1$  to  $C_6$  alkyl,  $C_1$  to  $C_6$  hydroxyalkyl,  $C_1$  to  $C_6$  alkoxy,  $C_1$  to  $C_6$  aminoalkyl, or  $R^3$  and  $R^4$  together form a  $C_1$  to  $C_5$  alkylene group; and  $R^5$  is selected from the group consisting of  $C_1$  to  $C_{22}$  alkyl and  $C_1$  to  $C_{22}$  mono and dihydroxyalkyl.

19. A hair dyeing composition of Claim 18 wherein X is selected from the group consisting of Cl, Br, I and  $R^5SO_4$  where  $R^5$  is  $C_1$  to  $C_3$  alkyl; and R,  $R^1$  and  $R^2$  are selected from the group consisting of a  $C_1$  to  $C_3$  alkyl group, or two of R,  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached form a piperazinium or imidazolium group, and  $R^3$  and  $R^4$  are each individually a  $C_1$  to  $C_3$  alkyl group.

20. A hair dyeing composition according to Claim 18 wherein the hair dyeing composition additionally contains at least one coupler selected from the group consisting of: benzene-1,3-diol, 4-chlorobenzene-1,3-diol, naphthalen-1-ol, 2-methyl-naphthalen-1-ol, 2-methyl-benzene-1,3-diol, 2-(2,4-diamino-phenoxy)-ethanol, 2-(3-amino-4-methoxy-phenylamino)-ethanol, 2-[2,4-diamino-5-(2-hydroxy-ethoxy)-phenoxy]-ethanol, and 3-(2,4-diamino-phenoxy)-propan-1-ol, 3-amino-phenol, 5-amino-2-methyl-phenol, 5-(2-hydroxy-ethylamino)-2-methyl-phenol, 3-amino-2-methyl-phenol, 3,4-dihydro-2H-1,4-benzoxazin-6-ol, 4-methyl-2-phenyl-2,4-dihydro-3H-pyrazol-3-one, 1H-indol-6-ol, and 2-aminopyridin-3-ol.

21. A hair dyeing composition according to Claim 18 wherein the at least one primary intermediate is selected from the group consisting of: benzene-1,3-diol, 4-chlorobenzene-1,3-diol, naphthalen-1-ol, 2-methyl-naphthalen-1-ol, 2-methyl-benzene-1,3-diol, 2-(2,4-diamino-phenoxy)-ethanol, 2-(3-amino-4-methoxy-phenylamino)-ethanol, 2-[2,4-diamino-5-(2-hydroxy-ethoxy)-phenoxy]-ethanol, and 3-(2,4-diamino-phenoxy)-propan-1-ol, 3-amino-phenol, 5-amino-2-methyl-phenol, 5-(2-hydroxy-ethylamino)-2-methyl-phenol, 3-amino-2-methyl-phenol, 3,4-dihydro-2H-1,4-benzoxazin-6-ol, 4-methyl-2-phenyl-2,4-dihydro-3H-pyrazol-3-one, 1H-indol-6-ol, and 2-aminopyridin-3-ol.



22. A hair dyeing composition according to Claim 21 additionally comprising a coupler selected from the group consisting of: benzene-1,3-diol, 4-chlorobenzene-1,3-diol, naphthalen-1-ol, 2-methyl-naphthalen-1-ol, 2-methyl-benzene-1,3-diol, 2-(2,4-diamino-phenoxy)-ethanol, 2-(3-amino-4-methoxy-phenylamino)-ethanol, 2-[2,4-diamino-5-(2-hydroxy-ethoxy)-phenoxy]-ethanol, and 3-(2,4-diamino-phenoxy)-propan-1-ol, 3-amino-phenol, 5-amino-2-methyl-phenol, 5-(2-hydroxy-ethylamino)-2-methyl-phenol, 3-amino-2-methyl-phenol, 3,4-dihydro-2H-1,4-benzoxazin-6-ol, 4-methyl-2-phenyl-2,4-dihydro-3H-pyrazol-3-one, 1H-indol-6-ol, and 2-aminopyridin-3-ol.

23. A process for dyeing hair comprising forming a hair dye product composition by mixing a developer composition and a hair dyeing composition as defined in Claim 18, applying to the hair an amount of the hair dye product composition effective to dye the hair, permitting the hair dye product composition to contact the hair for period of time effective to dye the hair, and removing the hair dye product composition from the hair.

24. A process according to Claim 23 wherein X is selected from the group consisting of Cl, Br, I and  $R^5SO_4$  where  $R^5$  is  $C_1$  to  $C_3$  alkyl; and R,  $R^1$  and  $R^2$  are selected from the group consisting of a  $C_1$  to  $C_3$  alkyl group, or two of R,  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached form a piperazinium or imidazolium group, and  $R^3$  and  $R^4$  are each individually a  $C_1$  to  $C_3$  alkyl group.